WHAT IS CLAIMED IS:

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1. Power conversion apparatus comprising:

a source-side inverter;

a drive-side inverter;

a dc current link coupled between an output of the source-side inverter and an input of the drive-side inverter; and

a controller for operating the source-side inverter in current mode and the drive-side inverter in a commutation mode.

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2. The apparatus of claim 1, wherein the controller commands the source-side inverter to perform current regulation on the dc current link during a first portion of each modulating and current mode space vector modulation during a second portion of each modulating cycle.

3. The apparatus of claim 2, wherein the controller varies duty cycle of each first portion to control average current in the dc link.

4. The apparatus of claim 2, wherein the controller operates the source-side inverter as a buck-chopper during each first portion to perform the current regulation.

5. The apparatus of claim 2, wherein during each second portion the controller modulates switches of the source-side inverter to extract fundamental frequency sinusoidal currents from an ac power source.

6. The apparatus of claim 5, wherein the source-side inverter is terminated in a capacitor bank; wherein the space vector modulation produces a current vector; and wherein the controller uses phase angle of the current vector to command the source-side inverter switches to connect selected phases of the capacitor bank capacitors to the dc current

link and maintain a relatively ripple-free current on the dc link.

7. The apparatus of claim 6, wherein controller also performs damping during each second portion of the modulating cycle by modifying the phase angle.

8. The apparatus of claim 7, wherein the controller modifies the phase angle by computing a Park vector of capacitor bank voltage, computing a second vector representing resonant frequencies of the voltage Park vector, regulating the second vector, and using the regulated vector to correct the phase angle.

9. The apparatus of claim 1, wherein the controller performs power factor control of the drive-side inverter such that motor current is in phase with motor back emf.

10. The apparatus of claim 1, wherein the controller commands the drive-side inverter to generate active vectors only; and wherein null vectors are imposed by the source-side inverter.

11. The apparatus of claim 1, further comprising position sensors for generating a signal indicating position of a motor emf vector; and wherein the controller generates a rotor position unit vector from the position signal, computes a motor current Park vector that is synchronous with respect to the emf vector, PI-regulates an imaginary portion of the synchronous motor current Park vector, uses the regulated imaginary portion to shift the position signal, and uses the shifted signal to select switches of the drive-side inverter.

12. The apparatus of claim 1, wherein the dc current link includes a diode bridge for bi-directional flow.

13. A controller for a first inverter coupled between a power source and a dc current link and a second inverter coupled between an ac drive and the dc link, the controller comprising:

a circuit for commanding the first inverter to perform current regulation on the dc current link during a first portion of each modulating cycle and current mode space vector modulation during a second portion of each modulating cycle;

the circuit commanding the second inverter to operate in commutation mode.

14. The controller of claim 13, wherein the circuit varies duty cycle of each first portion to control average current in the dc link.

15. The controller of claim 13, wherein the first inverter is terminated in a capacitor bank; wherein the space vector modulation produces a current vector; and wherein the circuit uses phase angle of the current vector to command switches of the first inverter to connect selected phases of the capacitor bank to the dc current link.

16. The controller of claim 15, wherein circuit also performs damping during each second portion of the modulating cycle by modifying the phase angle.

17. The controller of claim 16, wherein the circuit modifies the phase angle by computing a Park vector of capacitor bank voltage, computing a second vector representing resonant frequencies of the voltage Park vector, regulating the second vector, and using the regulated vector to

correct the phase angle.

18. The controller of claim 13, wherein the circuit performs power factor control of the second inverter such that motor current is in phase with motor back emf.

19. The controller of claim 18, wherein the circuit commands the second inverter to generate active vectors only; and wherein null vectors are imposed by the first inverter.

20. The controller of claim 13, wherein the controller generates a vector indicating back emf, computes a current Park vector that is synchronous with respect to the back emf vector, PI-regulates an imaginary portion of the synchronous current Park vector, and uses the regulated imaginary portion to select switches of the second inverter.

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21. Apparatus comprising:
an ac motor;
a first inverter having an input adapted to receive ac power;
a second inverter coupled to the ac motor;
means for operating the first inverter in current mode; and
means for operating the second inverter in commutation mode.